

REMARKS

Applicants respectfully request reconsideration of the present application in view of the foregoing amendments and in view of the reasons that follow.

This amendment adds, changes and/or deletes claims in this application. A detailed listing of all claims that are, or were, in the application, irrespective of whether the claim(s) remain under examination in the application, is presented, with an appropriate defined status identifier.

Claims 1, 12, 16-18, and 61 are currently being amended. Claim 3 has been cancelled without prejudice. After amending the claims, claims 1-2 and 4-62 are pending in this application.

Rejections under 35 U.S.C §103(a)***The Bollinger et al. Reference***

In Section 17 of the Office Action, claims 1-6, 9-10, 21-22, and 58-61 are rejected under 35 U.S.C §103(a) as unpatentable over U.S. Patent No. 5,688,415 (Bollinger et al.). Applicants respectfully traverse the rejection. Bollinger et al. does not disclose, suggest, or teach the claimed invention as recited in claims 1-6, 9-10, 21-22, and 58-61.

Claim 1 has been amended to include the feature of dependent claim 3. Claims 2, 4-6, 9, 10, and 21-22 depend from claim 1. Claim 3 has been cancelled without prejudice. Amended claim 1 recites:

... wherein the plasma generating electrode comprises at least two separate electrode segments which are spaced from each other;

Bollinger et al. fails to disclose, suggest, or teach an electrode with two separate electrode segments spaced from each other. In contrast, Bollinger et al. describes a single RF driven electrode 22 affixed between a diffuser 20 and an insulator 16 within a plasma chamber 14. (See Fig. 1 and Col. 6, lines 12-14.) A process gas tube 24 in the plasma chamber 14 supplies reactive gas to the diffuser 20 in the plasma chamber 14 during the etching operation. There is no

suggestion or teaching of modifying this plasma chamber structure to accommodate two separate electrode segments.

Additional evidence that Bollinger et al. does not suggest or teach using two separate electrode segments is the use of a photolithographic mask 62 over the substrate to be etched. The mask 62 has a pattern of openings used in the etching process. While the mask 62 may help in the use of one electrode, it makes a second separate electrode segment unworkable with the system of Bollinger et al. because openings in the mask may not have the same spacing as the two electrode segments, resulting in one electrode being positioned over a mask opening and the other positioned over a mask surface.

Dependent claim 10 also is not disclosed, suggested, or taught by Bollinger et al.. Claim 10 recites:

(d) moving the electrode across the substrate surface while establishing a plasma between the electrode and the substrate.

Bollinger et al. fails to disclose, suggest, or teach moving the electrode across the substrate surface while establishing a plasma between the electrode and the substrate. Indeed, the use of a mask over the substrate in Bollinger et al. makes it impossible for the electrode to move across the substrate surface while establishing a plasma. Advantageously, the claimed invention of claim 10 allows for the drawing of features without a mask. This feature is not taught or suggested by Bollinger et al..

Claim 58 has not been amended. Claim 58 recites:

(a) positioning a plasma generating electrode adjacent to an exposed surface of a substrate wherein the electrode is positioned to be spaced within 1,000 μm of the substrate surface;

Bollinger et al. does not disclose, suggest, or teach positioning a plasma generating electrode within 1,000 μm of the substrate surface. Indeed, Bollinger et al. teaches that the invention comprises “means for maintaining a small (typically 1-3 mm) known spacing between

the panel.” (Col. 2, lines 17-18.) There is no suggestion in Bollinger et al. that the spacing between the electrode and substrate be within 1,000 μm .

Bollinger et al. fails to disclose, suggest, or teach the claimed invention as recited in claims 1-6, 9-10, 21-22, and 58-61. Accordingly, a rejection of claims 1-6, 9-10, 21-22, and 58-61 under 35 U.S.C §103(a) based on Bollinger et al. cannot be properly maintained. Applicants respectfully request withdrawal of the rejection.

The Zarowin Reference

In Section 18 of the Office Action, claims 1-2, 4-11, 21-22, 33-34, 36-39, and 58-62 are rejected under 35 U.S.C §103(a) as unpatentable over U.S. Patent No. 5,811,021 (Zarowin). Applicants respectfully traverse the rejection. Zarowin does not disclose, suggest, or teach the claimed invention as recited in claims 1-2, 4-11, 21-22, 33-34, 36-39, and 58-62.

As discussed above with respect to Bollinger et al., amended claim 1 and dependent claims 2, 4-11, and 21-22 recite:

... wherein the plasma generating electrode comprises at least two separate electrode segments which are spaced from each other;

Zarowin fails to disclose, suggest, or teach an electrode with two separate electrode segments spaced from each other. In contrast, Zarowin describes a scanning plasma tool head where plasma gas comes through a gas input conduit 26 to a plasma tool head 30. Indeed, Zarowin is a plasma transport device that uses a tube terminating at a plasma head 30 near the surfaced to be etched. Specifically, Zarowin states:

Plasma head 30 is made of an electrically conductive porous material, such as an electrically conductive porous carbon, magnesium, or stainless steel, which is arranged so as to flow gas introduced into the hollow support stem 28 through the plasma head to the interior of the plasma chamber 36 within the housing 10.

(Col. 3, lines 39-45.)

Indeed, Zarowin describes a scanning plasma tool head where plasma gas comes through a gas input conduit. Such a conduit, or tube, is very different than a plasma generating device. There is no suggestion or teaching of a "plasma generating electrode" or modifying the plasma transport apparatus to include two separate electrode segments. Accordingly, a rejection of claims 1-2, 4-11, and 21-22 based on Zarowin cannot be properly maintained.

Claim 33 and claims 34 and 36-39 that depend from claim 33 recite:

- (b) a holder connected to the electrode to position the electrode bottom surface closely adjacent to and spaced from a surface of a substrate to within 1,000 μm or less;

As discussed with reference to Bollinger et al., Claim 58 and claims 59-62 that depend from claim 58 recite:

- (a) positioning a plasma generating electrode adjacent to an exposed surface of a substrate wherein the electrode is positioned to be spaced within 1,000 μm of the substrate surface;

Zarowin indicates that "the plasma head is carried in close proximity to a substrate 142" (Col. 6, lines 56-57). Nevertheless, there is no discussion or suggestion in Zarowin as to what this "close proximity" is. Moreover, Zarowin does not describe a plasma generating electrode (as required by the claims), rather it describes a plasma assisted transport apparatus. (See Col. 3, lines 3-5.) The considerations for distances to the etched surface in an etching apparatus for a plasma generating electrode compared to a plasma assisted transport apparatus are completely different. The transport apparatus is merely a tube that provides a conduit through which the plasma travels.

Zarowin fails to disclose, suggest, or teach the claimed invention as recited in claims 1-2, 4-11, 21-22, 33-34, 36-39, and 58-62. Accordingly, a rejection of claims 1-2, 4-11, 21-22, 33-34, 36-39, and 58-62 under 35 U.S.C §103(a) based on Zarowin cannot be properly maintained. Applicants respectfully request withdrawal of the rejection.

The Sakakibara Reference

In Section 19 of the Office Action, claims 1-6, 8-11, 16, 21-22, 33-39, and 58-62 are rejected under 35 U.S.C §103(a) as unpatentable over U.S. Patent No. 5,397,420 (Sakakibara). Applicants respectfully traverse the rejection. Sakakibara does not disclose, suggest, or teach the claimed invention as recited in claims 1-6, 8-11, 16, 21-22, 33-39, and 58-62.

As discussed above with respect to Bollinger et al., amended claim 1 and dependent claims 2, 4-6, 8-11, 16, and 21-22 recite:

... wherein the plasma generating electrode comprises at least two separate electrode segments which are spaced from each other;

Sakakibara fails to disclose, suggest, or teach an electrode with two separate electrode segments spaced from each other. In contrast, Sakakibara describes one machining electrode 21 used in the production of plasma for placement on a wafer 10. (See Fig. 5.) There is no suggestion or teaching in Sakakibara to modify the machining electrode or the vacuum vessel 40 that holds it to accommodate two separate electrode segments.

Claim 33 recites:

(b) a holder connected to the electrode to position the electrode bottom surface closely adjacent to and spaced from a surface of a substrate to within 1,000 μm or less;

Claims 34-39 depend from claim 33 and also require this limitation. As discussed with reference to Bollinger et al., Claim 58, and claims 59-62 that depend from claim 58, recite:

(a) positioning a plasma generating electrode adjacent to an exposed surface of a substrate wherein the electrode is positioned to be spaced within 1,000 μm of the substrate surface;

Sakakibara specifically teaches away from such a holder or positioning step. Sakakibara states: "a distance of several millimeters must be secured between the leading edge of the machining electrode 21 and the workpiece 10 to produce proper plasma." (Col. 4, lines 60-63, emphasis added.) There is no suggestion in Sakakibara that the spacing between the electrode and substrate be within 1,000 μm .

Sakakibara fails to disclose, suggest, or teach the claimed invention as recited in claims 1-6, 8-11, 16, 21-22, 33-39, and 58-62. Accordingly, a rejection of claims 1-6, 8-11, 16, 21-22, 33-39, and 58-62 under 35 U.S.C §103(a) based on Sakakibara cannot be properly maintained. Applicants respectfully request withdrawal of the rejection.

Rejections under 35 U.S.C §112

In Section 20 of the Office Action, claims 18, 60-61 are rejected under 35 U.S.C §112, second paragraph, as being indefinite. The Examiner asserts that the wording of claim 18 is confusing. The Examiner points out that claims 60 and 61 claim are duplicative. Claims 18 and 61 have been amended to overcome the rejection under 35 U.S.C §112. Applicants respectfully request withdrawal of the rejection.

Claim Objections

In Section 21 of the Office Action, claims 12-15, 17, and 19-20 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. Applicants have amended claims 12-15, 17, and 19-20 to be written in independent form. Applicants respectfully request withdrawal of the objection.

Allowed Claims

In Section 22 of the Office Action, claims 23-32 and 40-57 are noted as allowed.

Applicants believes that the present application is now in condition for allowance. Favorable reconsideration of the application as amended is respectfully requested.

The Examiner is invited to contact the undersigned by telephone if it is felt that a telephone interview would advance the prosecution of the present application.

The Commissioner is hereby authorized to charge any additional fees which may be required regarding this application under 37 C.F.R. §§ 1.16-1.17, or credit any overpayment, to

Deposit Account No. 50-2350. Should no proper payment be enclosed herewith, as by a check being in the wrong amount, unsigned, post-dated, otherwise improper or informal or even entirely missing, the Commissioner is authorized to charge the unpaid amount to Deposit Account No. 50-2350. If any extensions of time are needed for timely acceptance of papers submitted herewith, Applicant hereby petitions for such extension under 37 C.F.R. §1.136 and authorizes payment of any such extensions fees to Deposit Account No. 50-2350.

Respectfully submitted,

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By Harry C. Engstrom

FOLEY & LARDNER
Customer Number: 23524



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PATENT TRADEMARK OFFICE

Telephone: (608) 258-4207

Facsimile: (608) 258-4258

Harry C. Engstrom
Attorney for Applicant
Registration No. 26,876